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THE USE OF LOCAL NAMES IN GEOLOGY.

No FIELD of knowledge has ever experienced in the same short period, such a rapid expansion as have the geological sciences in these closing years of the nineteenth century. With this unparalleled advancement of modern geology, occasioned by the changes in fundamental conceptions, and the application of more refined methods of investigation, there has appeared, in every branch, an endless multitude of new and often seemingly useless names. The dropping of the old and familiar terms, the change in meaning of those retained, and the introduction of an unheard-of host of others, has brought forth long and emphatic protests against such innovations.

Many of these protests are not untimely. They come not alone from the layman, but from teachers and specialists. Everyone, who has come in contact with those not specialists, knows that the vast mass of technical terms and the cumbersome verbiage that is everywhere met with in the natural sciences are most disheartening features to the student, and at once raise well-nigh unsurmountable barriers to those who would only be too glad to take up such subjects. To the adoption of an elaborate terminology in any science this phase of the subject presents an obstacle more serious than all others combined.

The whole question is one that cannot be decided by discussion, no matter how able may be the arguments presented on either side. It is not whether the old terms alone are to be used in place of the free and unlimited coinage of new ones at a ratio perhaps of 16 poor ones to 1 good one, but whether from the very nature of the attendant conditions, the adoption of either plan is feasible. It seems not. As long as any branch of science lasts the specialists in that department will continue to introduce new terms to denote new conceptions and to make definitions more precise. In spite of all that others can do, changes in terminology will go on unabated. Protest is of no avail. A refusal on the part of the general scientific public to understand or to use the new names cannot prevent their adoption. Such action merely sets the majority outside the realm of influence. It is the specialist who sets the pace in nomenclature; others must keep up or drop out entirely. There is no other choice.

Protests against the use of new scientific names are really aimed at the unnecessary terms. In all of these protests there is almost invariably a failure to distinguish between two very different classes of terms. On the one hand the launching of new names is accompanied by a conscientious desire to better the condition of a science by clothing with suitable words the new ideas; on the other hand there is what a recent writer has aptly called a "prevalent and apparently incurable form of mania which busies itself in burdening science with a useless and formidable terminology." The first cannot be too highly commended, nor the second too deeply deplored. To be sure, it is not always possible for one not thoroughly up in a particular department to clearly discern, except in a few cases, the useful or the useless. Time alone can determine. Every progressing science must finally discard all of those titles that have served their purpose. It must also be prepared to receive all of the new ones demanded. Indeed, the rapidity with which a science is advancing is measurable, with but small degree of error, by the number of useful terms that are being proposed.

Much as it is to be deplored, it is nevertheless a fact that the mill from which the large and indifferent grist of new names is continually streaming is not wholly in the hands of those best qualified to manage it. From the very nature of the case there must ever be in its running almost no control. The real factor rendering the mighty host of unfamiliar titles so appalling is that a very large proportion of all of the new names published in the various sciences are proposed by those who are least fitted for the task. The great burden which the literature of a science must carry is the work of amateurs or those who are incapacitated for real scientific work, but fancy that knowledge is advanced, or a new science is founded when they let loose a flood of odd names upon the unoffending world. The inundation is more disastrous in some other departments of science than geology, but among the geological branches it is most apparent, perhaps, in palæontology, where the majority of the names catalogued are spurious.

Fortunately for everybody concerned there is a remedy for the evil that is as divine in its effect as was the discovery of ether in alleviating the physical sufferings of mankind. There is an immutable law that determines the perpetuation of scientific terms, regardless of the quality or of the countless myriads proposed. It is the same law that governs in literature, life and all else — the survival of the fittest. It makes no difference what the new terms are, or where they apply. If they are appropriate, useful and expressive they will last — but not fixed or for all time, only until they have fulfilled their mission, until others more harmonious with the ever-changing conditions take their places. If the proposed titles fail to meet a long felt want they are at once dropped, and forever forgotten. Which, among the new terms proposed, are the really useful ones, the ones destined to survive a while, and which the unnecessary ones doomed to perish at their birth, no man can tell. Moreover, it is absolutely beyond the power of its author, or of any other person, to say which names shall be perpetuated and which shall not. Every new term depends for its life not on the wish of its originator but on its own merit. It goes for what it is worth. With the many others it takes its chances. The final tribunal is the scientific public.

In the application of technical titles neither of the two extremes, too many or too few terms, is desirable. It is not advisable, if the best interests of geological science are to be considered, to adopt by itself either a rigid, unchangeable, and spare system of nomenclature, or one in which there is ponderous verbiage. The proper mean can be reached only after the long and fierce struggle for existence is over. The adoption of a terminology modeled according to the first extreme, inflexible and unchanging, manifestly can never meet the wants of a growing science. The establishment of such an arbitrary system could be defensible only in the case of a dead subject—a condition that no geologist is willing to admit for his science. Much as simplicity of statement should be sought it is not always possible, nor is it always desirable, that it should be followed at the expense of precision and easy understanding.

On the other hand, a scheme built upon the plan of the second extreme is less likely to be tolerated than the first. What is gained in terseness and exactness may be wholly lost in other directions. The new-born terms become mere symbols, perfectly meaningless and useless to all except the author. There is great danger of producing exactly the opposite effect from that intended. Instead of a beautiful fabric, the wonder and admiration of all, there is merely a lifeless, shapeless mass, shunned by many, cared for by none.

There is another phase of the question about which exists much confusion. Little mention is ever made of the twofold field of usefulness for which every science is designed; and in none is a dual conception more important than in geology. The one phase requires a terminology that is technical and special, that is established primarily for the active investigator and that is in no way intended to be memorized by the layman or any others, or to reach outside of a small and select circle. There will always exist a need for some such terms and the terms will always come in reponse to the need. No amount of protest will frighten the specialist out of using them. It may clutter up the scientific literature; it may be the bugbear of workers in closely allied branches of science; it may divert the attention of many from the subject itself. No matter. It has come to stay.

The other field demands names that are general, popular, simple, and free from technical appearance. The literature thus established is intended for an entirely different class from that which the first category takes into consideration. This distinction is rarely made, yet no one can doubt the existence of two wholly different audiences. In the presentation of every discourse the latter cannot be for both. It must be one or the other. It is the inalienable right of every author and every lecturer to select his audience. No one wishing to reach the many would think for a moment, of letting loose on his listeners or readers a flood of absurd and meaningless technicalities ; nor would a small, selected group of specialists wade through unknown depths of "simple" verbiage.

The coining of new terms to designate new ideas or more precise definitions has a bearing still broader than any yet considered in any of the numerous protests that have been presented. The layman complains of the host of "long names" with which every branch of science abounds ; the scientist criticises the terminology employed in the various branches other than his own ; the specialist bemoans the deplorable condition of the nomenclature in all branches as well as his own. Now, so far as the question under consideration is concerned, all are on identically the same plane. When a reason for this is sought only one stands out permanently. Each critic is, in reality knocking loudly for admission to other departments, without the same hard work and training that he has bestowed upon his own. Moreover, the protests against the established terminology are all one way ; were they not, the opposite view would not be so totally obscured. The demands for transfer from one department to another is invariably from the more simple and general to the more complex and special. Why the layman should desire to leave his own field to enter the domains of science unknown to him is as inexplicable as why a stratigraphical geologist should want to become a geographer or petrographer, or *vice versa.* Seldom does a scientist think of becoming an artisan. Yet if he should desire to do so, he would be, after five minutes' talk with a machinist, carpenter, or electrician, confronted by so many unfamiliar terms — technical terms of every day use — that he would at once cry out for greater simplicity of language. In the rapidly advancing branch of applied electrical science, for example, new terms are constantly appearing. The reason that these technical names are so difficult to understand is that each is an epitomized history of the special part, its position and function in the complete mechanism.

In the geological sciences the technicalities play the same rôle as they do in the arts and in business. To the large majority of people the name Monadnock, for instance, may mean only a big building, a war ship, or an Indian, but to the professional geographer it has attached to it a special meaning In a single word it sums up the complete life history of a particular kind of relief feature — a history that would require the space of a long chapter to describe in "simple" language every time it is referred to. If such a term chance to be a happy choice, if it save the busy worker the writing of several pages in order to express the same idea in another way, or "if it prove to be acceptable to workers in its field," as its author says, "it will take root and flourish ; if not, it will soon wither away and be seen no more."

Granite, trap and greenstone, may be good enough "simple" names to apply to certain rocks, but the terms have become so general that in exact work they now mean almost nothing. To the petrographer the name pegmatite at once suggests a variety of granite that has a long and intricate history, totally different from dozens of other kinds of granite, each having a record equally complicated and equally diverse. This term incorporates in three short syllables history enough to fill a large volume. But he who wishes to know something about this particular kind of granite called pegmatite, little cares to waste his time in going over the whole literature of granite that he may get a little of the desired information. Likewise, who will not say that such a name as websterite, applied to a dark colored trap-like rock, does not at once separate the mass from a hundred other stony aggregates having a similar general appearance, and at the same time indicate a whole train of important events that would be otherwise passed over if the more popular name of trap were used alone. It may be argued that these are useful and necessary new names. Yet who could pass judgment on them until after they were proposed? And who can pass judgment on any terms until they are suggested? Or who can say whether they would be useful or not until they are tried?

In this day and age the geological sciences are protected at the start by one great safeguard against the promiscuous introduction of new names. There is one test that every new name must stand before it can venture to ask for recognition. This is the test of definition. Every new name in geology must be properly defined before it can be noticed at all. Its subsequent career depends upon its utility.

It has been already intimated that the rate with which a science is advancing is measurable by the number of new and useful terms that appear. At present this statement is especially true of some of the geological sciences. To be sure, new terminology does not necessarily indicate new facts, but when new terms receive the favor of those best qualified to pass judgment upon them, of the specialists in the particular department, when also these names stand for new conceptions, the branch of knowledge thus affected is certainly undergoing such radical change that the final outcome must be essentially very different from the old. This rapid change in terminology is at present characteristic of several of the branches of geology.

In no department has the coining of new names gone on more vigorously than in stratigraphical geology. The reason is to be found partly in the inherent conditions existing in this field, and partly in the complete change of base that this branch of the science has undergone in late years. The fundamental conception of the geological formation, whether large or small, whether a single bed or a great series, is a sharply defined "geological unit," instead of a vaguely bounded "group" of layers. The former is now capable of being clearly demarcated by strictly physical characters, that are the direct outgrowths of the actual conditions giving rise to the formations themselves; the latter is too often based upon trivial or accidental characters which are relatively unimportant as critical criteria, either in classification or correlation.

The principle underlying the recent naming of geological formations gives to each stratigraphical unit a special geographic designation, derived from some prominent town, watercourse or land form, within the boundaries of that formation. As thus established the latter is a well-defined and independent unit, having a definite place in the general geological scheme, no matter how this may change afterward, or what method of classification may be followed. This definite stratigraphical unit contrasts strangely with the unwieldy, ill-defined and usually little understood large formation of the past, the very name of which indicated either lack of exact knowledge of it itself, or a covering up of ignorance regarding its affinities. By this new method, or if it be more exact, by the vigorous application of an old principle that was so loosely followed as to be almost unrecognizable, geological nomenclature has been certainly greatly increased, even enormously enlarged by the introduction of the new plan. The former list of names numbered only about two score, indicating all of the smallest subdivisions which went to make up the general geological column. The names of the new list run up into the hundreds and even thousands, are different in every considerable area, and additions are constantly being made.

It is against this copious multiplication of geological names that the protests have been chiefly made. Curiously enough the struggle has been reduced to a clash between the practical field geologist on the one hand, and on the other the laboratory worker, those especially interested in the other departments than stratigraphy and the palæontologists, who see their standard classification abandoned, and their usefulness in the domains of geology diminished. And the former have won.

When, a decade and a half ago, various geological surveys in this country were established or reorganized, those entrusted with the work soon found that, if speedy and exact results were to be secured, and if substantial data were to be obtained upon which all other workers could also build, something else must be devised than the existing scheme of vaguely defined geological formations, having no comparable limits in different provinces and even diverse values in different parts of the same province. A natural, yet elastic foundation must be secured. Practical experience and the demands of the times quickly pointed out a suitable plan. So well has it served the purpose and so readily adaptable is it to the varying conditions met with on all sides, and the unforeseen exigencies constantly arising, that it has brought under its standard nearly every practical field geologist.

The method of designating geological formations by geographical names certainly does greatly increase the nomenclature, at times seemingly to a burdensome extent. This appears to be the only objection that has been yet urged against it that might call for notice. Yet, to all, except those who do not care to go beyond the ordinary text-book in geological work, even this seems hardly necessary, since it is offset by so many manifest advantages.

It may be truly said that no greater boon to the working geologist has been yet devised, than the plan of designating, geographically, geological units irrespective of exact position or age. Incorporated in the new plan are all the salient good features of the old method, while none of the objectional ones are retained. Since its adoption a vast mass of valuable information has been obtained that was previously unthought of, information that is in a shape to be always used, without the necessity of the user personally going all over the ground again; the other departments of geology have been greatly aided; and stratigraphical geology itself has made greater real progress in the short decade that has elapsed since the method with its new impetus came into general use than in all time previous. In the same short period more has been learned about the nature of sedimentation, the actual relations existing between rock formations, and the structure of the lithosphere than was possible before. In fact a rational physical basis for geological correlation and classification has been found.

The real meaning, then, of the multitude of new names that has recently made its appearance in the literature of stratigraphy, is the practical adoption of more refined methods of geological work, the provision of suitable means for the collection of more exact geological data, and the grasping of more advanced and rational conceptions regarding geological correlation and classification.

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